TWO POSSIBLE OBJECTS OF SEARCHES FOR HIGHLY DEVELOPED CIVILIZATIONS

Professor G. I. Pokrovskiy

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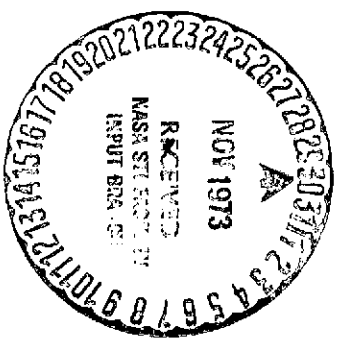

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16. Abstract

A discussion of K. E. Tsiolkovskiy's concept of the closed planetary system, with astrophysical speculation that such a system may presently exist in two separate constellations — Taurus and Monoceros.

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IN SEARCH OF ALIEN CIVILIZATIONS

In the problem of extraterrestrial civilizations, which has more than once been discussed in the pages of "Priroda"[1], the most significant questions are those which pertain to the search for such civilizations and how to establish communications with them. In the articles by G. I. Pokrovskiy and V. B. Kudrin, which were brought to the attention of the readers, hypotheses are set forth which, in the author's opinions, could aid in the solution of these questions.

[1]See, for example: B. N. Panovkin. Extraterrestrial Civilizations – Problems and Discussions. "Priroda", 1971, No. 7.

TWO POSSIBLE OBJECTS OF SEARCHES FOR HIGHLY DEVELOPED CIVILIZATIONS

Professor G. I. Pokrovskiy[1]

As is known, in his predictions of man's conquest of space K. E. Tsiolkovskiy predicted that the primary settlements of highly developed beings would be located in outer space in devices especially built for this purpose. In the final analysis, such devices will reach the dimensions of planetary systems[2] and will be enclosed within a sealed envelope which locks within itself the central star, which will serve, in this system (at a certain stage of its development) as the basic source of energy. /97*

About 10 years ago the well-known American astrophysicist F. Dayson independently noted that certain heavenly bodies having a size on the order of the Sun, but which primarily irradiate infrared radiation cannot be explained theoretically proceeding from known principles of astrophysics. The difficulty is explained by the fact that the irradiating surface of such infrared objects should be vast — having a diameter on the order of the orbit of Saturn. Dayson suggested that such a system could only be an artificially manufactured envelope which surrounds an ordinary solar-type star and locks in its radiation, transforming it into the corresponding flux of infrared rays.

Even Tsiolkovskiy showed that such a sphere could be constructed in the form of a system of orbital rings, laid down one within the other and having axes variously directed[3] (Figure 1). These facts were recently analyzed by Yu. V. Biryukov.

The possibility of the existence of orbital rings, their stability and rigidity were examined from the point of view of the fundamental laws of stellar mechanics by the author in his report at the Sixth Readings Devoted to the

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[1]The N. Ye. Zhukovskiy Air Force Engineering Academy, Moscow.
*Numbers in the margin indicate pagination in the foreign text.
[2]K. E. Tsiolkovskiy: Zhizn' v Mezhzvezdnoy srede [Life in Interstellar Space], "Nauka" Press, Moscow, 1964.
[3]Ibid, p. 32.

Development of the Scientific Heritage and Development of the Ideas of K. E. Tsiolkovskiy (Kaluga, 1971).

If a solar-type star were enclosed in an envelope made up of a system of orbital rings, some types of openings would have to exist between the rings, through which radiation from the star would escape to the outside, diffusely reflected from the inner parts of the orbital rings. It is extremely probable that during this process the maximum energy in the radiation spectrum will not be shifted by any selective reflection. Then in this reflected component of radiation one should expect a maximum of energy within the wavelengths of light, from 0.1 to 1 μm. As is known, for solar radiation the maximum /98 corresponds to a wavelength of nearly 0.55 μm.

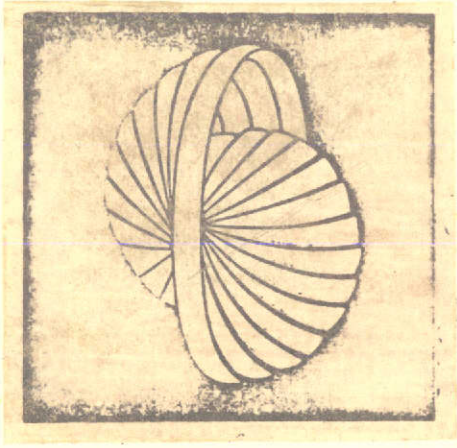

Figure 1. "A Sphere" Made Up of Orbital Rings Which, According to K. E. Tsiolkovskiy's Suggestion, Could Have Been Created by a Highly Developed Civilization with the Goal of Fully Capturing the Radiation of a Star Located at the Center of This "Sphere". (The author's drawing based on K. E. Tsiolkovskiy's idea).

Apparently, the energy of radiation of this component is significantly less than the energy of thermal radiation of the outer parts of the orbital rings. One can expect that the temperature of outer part of the rings will comprise, totally, a few hundred degrees Kelvin, and then the energy maximum in the radiation spectrum should correspond to the infrared range of wavelengths from 1 to 10 μm.

This infrared component, obviously, carries a basic part of the radiation energy. Its power should surpass the energy of radiation emitted through the openings between the orbital rings by approximately one order.

Hence, one can assume that in the radiation spectrum of the device made up or orbital rings surrounding a solar-type star, one should expect two energy maxima, one of which corresponds to tenths of a micron, while the other — to several microns (Figure 2).

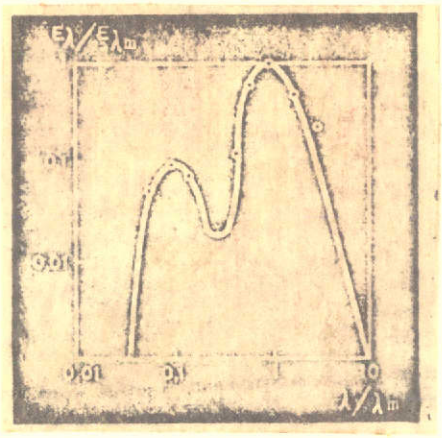

Figure 2. Distribution of Energy in the Spectrum of Object R in the Constellation Monoceros: $E_\lambda | E_{\lambda m}$ — Spectral Density of Energy; $\lambda | \lambda_m$ — Relative Wavelength; Heavy Line Corresponds to Planck's Law of Radiation For A System Composed of Two Sources with Differing Temperatures; Circles Correspond to Data of Observations. The radiation spectra of objects which are a system of orbital rings surrounding a solar-type star corresponds to precisely this distribution. Therefore R in the constellation Monoceros can be considered to be an object which should be studied during searches for highly developed alien civilizations.

Referring to the literature[1], one can establish that there are at least two astronomical objects whose radiation spectra have been found to have two maxima which correspond to the indicated wavelengths. These are object T in the constellation Taurus, whose spectrum has been measured more or less accurately, and object R in the constellation Monoceros.

Thus, hope appears that the visions of Tsiolkovskiy concerning the possibility of the existence of highly developed civilizations in space, civilizations which have created great "etheral cities" (in the terminology of K. E. Tsiolkovskiy), to my view, can obtain observable confirmation. The cited facts should provide grounds for a further study of the spectra of stars having an intense infrared component and for an analysis of these spectra from the viewpoint developed here.

[1] Infrakrasnaya astronomiya [Infrared Astronomy], (A Collection of Articles Edited by P. Brankazio and A. Cameron), "Mir" Press, Moscow, 1971.